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ABSTRACT

This research tested a structural equation model of educational outcomes for three socioeconomic status (SES) groups of African-American students enrolled in a community college (total sample of 315). The structural model, which was based on a variant of Tinto's (1987) model, contained two exogenous constructs, educational intentions and commitments, and three endogenous constructs, academic integration, social integration, and educational outcomes. The study demonstrated that higher levels of academic and social engagement had positive direct effects on educational outcomes for all students regardless of SES background. Other paths that were supported included the positive direct effects of goal and institutional commitments and the negative impact of external commitments on social integration. A significant positive path was also indicated from academic integration to social integration. Significant structural differences were not present in the measurement of model constructs or the process of educational outcomes among lowest, lower to middle, and middle to upper SES groups. Five tables present study findings. (Contains 34 references.) (Author/SLD)

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A Multigroup Structural Equation Modeling Approach to Test for Differences in the Educational Outcomes Process for African American Students From Different Socioeconomic Backgrounds

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Running head: AFRICAN AMERICAN STUDENT EDUCATIONAL OUTCOMES

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Abstract

This research tested a structural equation model of educational outcomes for three socioeconomic status (SES) groups of African American students enrolled in a community college. The structural model, which was based on a variant of Tinto's (1987) model, contained two exogenous constructs, educational intentions and commitments, and three endogenous constructs, academic integration, social integration and educational outcomes. The study demonstrated that higher levels of academic and social engagement had positive direct effects on educational outcomes for all students regardless of SES background. Other paths that were supported included the positive direct effects of goal and institutional commitments and the negative impact of external commitments on social integration. A significant positive path was also indicated from academic integration to social integration. Significant structural differences were not present in the measurement of model constructs or the process of educational outcomes among lowest, lower to middle, and middle to upper SES groups.

A Multigroup Structural Equation Modeling Approach to Test for Differences in the Educational Outcomes Process for African American Students From Different Socioeconomic Backgrounds

While African Americans are growing in numbers and in proportion of the population, they have failed to reach proportional enrollment in higher education. Although the number of African Americans entering college has been increasing, the percentage of high school graduates who go on to college has been declining since the late 1980s (Hauser, 1992). Not only do African Americans have lower participation rates in higher education, once enrolled, they experience higher attrition rates, lower GPAs and slower rates of progress than white students (Stewart, 1987; Gosman et al., 1983; Kroc II, 1992). Since 60% of the residents of underclass neighborhoods are black (Mincey et al., 1990), failure to achieve the equitable participation of Blacks in higher education eliminates their best opportunity for advancement into the economic mainstream (Three Realities, 1990).

Recent Census Bureau reports indicate that while Americans reached record levels of educational attainment in the latter part of the 1980s, a wide gap persists between blacks and whites. At the college level, 21% of whites completed four or more years compared with 11% of blacks. Nettles (1988) found that five years after admission to 30 institutions ranging from large public universities to smaller black colleges, 56% of the black undergraduates had dropped out compared to 38% of the white

students. In a study of 39 institutions, Smith (1992) noted that the retention of African American students after one year was lower than the comparable figure for white students (79% versus 83%) and widened after two years (65% versus 73%). After four years, 15.2% of African American students graduated compared with 31.7% of white students.

Models of educational attainment which emphasize student background characteristics to account for academic success have been less helpful in understanding influences on the outcomes of black collegians than has been the case for white students (Smith, 1993). Smith proposes that the key to increased rates of enrollment, persistence, and graduation of African Americans may be imbedded in the institution's culture. Many minority students in higher education find the climate on campus to be more alienating than involving. Nettles (1988) found that African American students had significantly greater feelings of racial discrimination by faculty, staff and other students. They reported awkward relationships with faculty members, many feeling faculty were uncomfortable in their presence and avoided interaction with them outside the classroom. Nettles found that these feelings impacted negatively on educational outcomes.

Much of the empirical research on the educational outcomes of African Americans has been conducted at four-year colleges. Consequently, a considerable gap exists in the literature with regard to African Americans enrolled at community colleges which typically serve as higher education entry points for minority

students. Another shortcoming of the current research on African Americans is that many studies do not adequately reflect the complicated nature of minority life since they assume all African Americans are economically disadvantaged. Study results which are based on inappropriate socioeconomic aggregations may gloss over important distinctions within student groups while research that recognizes the diversity of minority life by including meaningful economic information should enable more informed discussions concerning the impact of higher education on minority Americans. Using a policy-oriented approach that emphasized variables community college policy makers are able to affect, this study attempted to understand the causal influences on African American student achievement in higher education. Comparisons were made across groups defined by socioeconomic background.

Conceptual Overview

Since research suggests that college experiences of African American students may be more important to college performance than precollege characteristics (Smith, 1993; Nettles, 1988), research should focus on aspects of the college environment which inhibit or foster the achievements of African Americans. Many studies of higher education outcomes have been guided by Tinto's (1987) model of student attrition. Implicit in the model is the idea that practices and pedagogical methods can be influenced by institutions in directions that will lead to improved achievement by students. According to the model, dropout results from interaction between an individual with certain abilities, intentions, and commitments and

other members of the academic and social systems of the college. Positive experiences lead to increased intellectual and social integration which positively impacts on retention while negative experiences increase the likelihood of withdrawal.

Tinto's model is the most widely tested model of student retention in higher education and much of the empirical evidence validates the importance of integrating experiences to the process of student persistence and development. The conceptual linkages described in the model also appropriately describe the process of black student educational achievement.

In a study designed to explore whether black students progress at a slower pace than white students and, if so, what factors bring about differential progression rates, Gosman et al. (1983) found evidence that the institutions racial composition affects progression patterns and mediates the relationship between race and performance. The greater the congruence between students' goals, values and attitudes and those of the other students, the greater the probability of successful student performance.

Pascarella and Terenzini (1980) found no significant differences between white and black students in the preenrollment, social, or academic performance factors influencing voluntary freshman-year persistence behavior. In a subsequent study, Pascarella (1985) sought to determine the extent to which the constructs in Tinto's model were differentially associated with bachelors degree completion for black and white students. For all race groups, academic and social integration had the strongest and

most consistently positive association with degree completion.

After finding that support programs which exerted a significant effect on minority student retention were directed towards social rather than academic integration, Sondgrath et al. (1992) concluded that motivational and social factors should be examined with respect to minority achievement. Davis's (1991) comparative study of black students on black and white campuses addressed the relationship between social support and academic success. A key finding from this research was that black students on white campuses who had good relations with faculty never seriously considered dropping out and had greater satisfaction with their campus experience.

In addition to encouraging black students to persist, academic and social integration have been demonstrated to effect academic achievement and personal development. Nettles et al. (1985) found that black students' perceptions of faculty concern for students' academic and career plans and student satisfaction with peer relations had an important impact on the students academic performance. Fadale (1990) found that minority student success was positively correlated with a hospitable and accepting academic environment. Connecting with the college through faculty, staff, or peer groups cultivated a sense of belonging which was related to favorable academic outcomes.

It is documented in the behavioral sciences that social class in strongly associated with educational attainment (Baird, 1984). Students from low SES families less frequently plan to attend

college, less frequently attend college, and when they do, less frequently attend four-year colleges. While ethnic and cultural groups share a number of overarching beliefs, values, and behavioral styles, there are enormous within-group differences caused by factors such as social class. Wilson (1978) argues that class is a major factor that stratifies the African American community. Unfortunately, diversity within groups has received insufficient attention within the educational literature (Baird, 1984).

Research indicates that academic performance differences of minority children in urban schools are significantly related to levels of socioeconomic advantage these students experience (Schultz, 1992). Minority children who experienced more socioeconomic advantage were typically found to perform better academically than students with less advantage. These effects appeared to be independent of intellectual abilities. Schultz also points out how infrequently research on achievement and motivation has focused on more socioeconomically advantaged minority populations. He concludes this particular practice has tended to ignore the diversity related to social class differences within minority populations and has effectively obscured an important source of information about achievement performance and motivational processes in minority children.

In order to better understand factors that contributed to low achievement among minority students, Okagake et al. (1991) contrasted low-achieving and high-achieving minority students and

found that differences were a function of mediating factors related to socioeconomic variables. Donovan (1984) concluded that the persistence process of low income African American students is similar to the process for college students in general. Consistent with Tinto's model, Donovan found that persistence was largely the result of academic integration. Academic grades were the most important direct determinant of persistence among low income African American students.

Pascarella and Terenzini (1983) used the concepts of academic and social integration to build a path analytic model of student persistence with a residential four-year population. They found general support for the influence of academic and social integration in student persistence, however, in a follow-up study, Terenzini, Pascarella, Theophilides and Lorang (1985) failed to identify a significant and direct path between academic integration and dropping out.

Moline (1987) used path analysis to test a model that placed emphasis on academic variables and found that GPA had the largest statistically significant impact on persistence. Braxton, Duster and Pascarella's (1988) analysis found academic integration to be significantly related to persistence, but social integration failed to link directly with persistence.

Much of the Tinto-related research on minority students has been based on samples drawn from predominantly white, four-year colleges and universities. Consequently, relatively little is known about the process of minority student persistence and

development on urban community college campuses. This is so despite the fact that these colleges have traditionally served as higher education access points for minorities.

A body of research also indicates that while students may share minority group status, racial and ethnic groups often exhibit distinctive interaction experiences. Shared minority status should not obscure the fact that in many important ways racial and ethic groups are different. Colleges frequently fail to recognize the need for group specific modifications to policies or programs, resulting in generic interventions that have little relevance and little chance of success (Castle, 1993).

Using a policy-oriented approach that emphasized variables educational policy makers are able to affect, this study attempted to understand the causal influences on African American student achievement in higher education. Comparisons were made across groups defined by socioeconomic status background.

Methodology

Design and Sample

This was a single institution study conducted at a large urban community college located in the Northeast. Approximately 11,000 students enrolled in credit courses during recent semesters. In Fall 1980, African American enrollments accounted for 62.5% of the student body but by Fall 1994, 43.4% of students were African American, 42.6% white, 8.1% Asian, and 5.3% Hispanic.

The overall study design was longitudinal with data gathered at two points-in-time, separated by a 15 week semester. The sample

was defined as first-time African American students enrolled full- or part-time, in day, evening or weekend classes.

During the first week of the Spring 1990 and Fall 1990 semesters, students enrolled in randomly selected introductory courses were asked to complete an initial questionnaire. This survey solicited information about personal, family, and educational background, educational expectations and academic and career plans. During the final weeks of the first semester, a follow-up questionnaire soliciting information about subsequent educational and enrollment plans and semester experiences was given to students for whom useable initial questionnaires were available.

A total of 377 first-time African American students enrolled during the spring term completed useable initial questionnaires. One hundred seventy-eight (47.2%) of the initial sample from spring completed useable follow-up questionnaires. For the fall semester, a total of 475 African American students completed useable initial questionnaires. Of this group, 162 (34.1%) completed useable follow-up questionnaires.

Since research has indicated that the early semester intentions of students to leave college after a term or academic year is strongly associated with actual attrition behavior (Bean, 1983; Pascarella et al., 1983; Grosset, 1982), the samples were reduced by eliminating students who indicated on the follow-up questionnaire they had completed their goals at the College and consequently would not be returning in future semesters. The elimination of self-reported goal completers resulted in a final

spring semester sample of 168 and a final sample of 147 fall students which were combined for subsequent analyses thereby yielding a total sample of 315.

The Structural Model

The present research tested a structural equation model of educational outcomes for three SES groups of African American students enrolled in a community college. The structural model, which was a variant of Tinto's model, contained two exogenous constructs and three endogenous constructs (Figure 1). The exogenous constructs included educational intentions and commitments and external commitments while academic integration, social integration, and educational outcome were treated as endogenous constructs. The measurement component of the model, although not pictured in Figure 1, was also included in the analysis.

Insert Figure 1 about here

Variables

The measures used to define the conceptual areas were suggested directly by the Tinto model, adapted from instruments employed in previous validations of the model, or adopted from prior research conducted at the College. Goal and Institutional Commitment measures included: highest degree aspirations (1 = None; 2 = Certificate; 3 = Associate; 4 = Bachelors; 5 = Masters; 6 = Ph D or Ed D), community college degree aspirations (1 = plans to earn

degree; 0 = does not plan to earn degree), definitiveness concerning educational plans (1 = goal certainty; 0 = goal uncertainty), and transfer intentions (1 = no; 0 = yes). External Commitment measures were: size of financial aid award in studied semester, weekly hours spent working at an off-campus job, number of dependents, and support of family and friends for college attendance (1 = no support; 5 = a great deal of support).

Measures of academic and social integration included several scales adapted from the work of Pascarella and Terenzini (1980) and Terenzini et al. (1984) and several single item indicators. Academic Integration measures were: Faculty Concern for Teaching and Student Development scale (range of 5 to 25), Academic Development scale (range of 5 to 25), Classroom Involvement scale (range of 12 to 32), number of out-of-class contacts with faculty/staff for academic reasons, and semester GPA. Social Integration measures included: Out-of-Classroom Integration scale (range of 3 to 15), Peer Interaction scale (range of 4 to 16), and satisfaction with the quality of student-to-student interaction (1 = not at all satisfied; 5 = extremely satisfied). Educational outcome included two dimensions: persistence over the first semester (1 = enrolled the following semester; 0 = not enrolled the following semester), and self-assessed student progress index based on 19 cognitive and noncognitive areas of growth (range of 19 to 76).

Statistical Procedures

Structural equation modeling with LISREL was used to

simultaneously test the model across SES groups in order to determine if different processes were involved in the educational achievements among African American students. SES was a trichotomized measure with classifications of lowest, lower to middle, and middle to upper. Students were assigned to an SES category based on the neighborhood in which they resided at the time of the study. In the sample of 315, 52.1% of the students were from lowest SES neighborhoods, 27.9% were from lower to middle SES backgrounds, and 20.0% from middle to upper SES neighborhoods. Separate covariance matrices were calculated for each SES group.

The underlying parameter estimates were determined for each SES group through a maximum likelihood solution and examination of goodness of fit measures. Differences in likelihood-ratio chi-square statistics were computed between a model where equality constraints were imposed and a model where equality constraints were not imposed. If the difference was determined to be significant, parameter estimates for those structural paths were considered to be statistically different for the SES groups.

Since invariance testing across groups assumes well-fitting single-group models, a prerequisite to testing for invariance is establishing a baseline model estimated separately for each group (Byrne et al., 1990). An initial recursive model was specified using paths described in Figure 1. The a priori structure of the measurement component of the model posits that each indicator has a non-zero factor loading on only the factor it is hypothesized to measure, covariances among the concepts are freely estimated, and

the uniqueness associated with each measured variable are uncorrelated.

To fix the scale of the latent constructs, the first lambda of each measure was fixed to 1 and each nontarget loading was fixed to 0. The other lambda elements and the diagonal elements of theta epsilon, theta delta, and psi were estimated. Beta and gamma were designed to test the causal linkages depicted in Figure 1 with three gamma and two beta elements to be estimated. The covariance matrices were analyzed separately for each group since this stage of the analysis did not impose any between-group constraints on parameters.

Interpretation of the chi-square test should acknowledge an implicit alternative hypothesis (Hayduk, 1988; Bollen, 1987), therefore, the model of interest was compared to a null model which contained no effects in the causal model by setting all beta and gamma coefficients to 0. Testing a null model may also be useful with extremely small samples to assure that the chi-square test has sufficient power to discriminate between models.

The null models generally appear to provide a poor representation of the observed data across the three SES groups (Table 1). Using an alpha of 0.05, the chi-squares were significant for the three SES models. The a priori models represented improvements in fit over their respective null models. The X^2/df indicated the a priori models for lower to middle and middle to upper SES groups fit the data adequately and the goodness of fit index (GFI) and adjusted goodness of fit index (AGFI)

associated with all three a priori models reflected improvements over the null models. While overall fit indices for the a priori models were satisfactory, modification indices associated with fixed elements in the beta matrix were large indicating an ill-fit in the model's structural portion.

Insert Table 1 about here

A large modification index for the lowest SES model (22.75), the lower to middle SES model (17.07), and the middle to upper SES model (12.73) represented the path from academic integration to social integration. Relaxing this beta in the three models resulted in statistically significant differences in chi-square as well as improving the other fit indices (Table 2).

Insert Table 2 about here

The hierarchy of invariance that was tested included:

H1: Equality of form

H2: Equality of scaling

H3: Equality of causal linkages between exogenous and endogenous concepts

H4: Equality of causal linkages between endogenous concepts.

Each hypothesis was tested to assess which best matched the data. Tests of invariance which impose constraints on particular parameters across groups necessitate the simultaneous analysis of

data from all groups in order to obtain efficient estimates (Joreskog and Sorbom, 1989). Consequently, the models for each SES group were run simultaneously.

In testing for equality of form, the pattern of fixed and free parameters were consistent with that specified in the baseline models. The models across groups were hypothesized to have the same pattern of fixed and free values in the matrices containing structural coefficients and the variance/covariance matrices. Non-fixed parameters were not restricted to have the same value across groups in H1. The chi-square for this unconstrained model, which was 422.03 with 384 degrees of freedom (Table 3), served as a point of comparison in further invariance testing.

Insert Table 3 about here

The minimum condition of factorial invariance is the invariance of factor loadings (Marsh & Grayson, 1990). The fit of the model that required all factor loadings to be the same (H2) was compared with the fit of the model that did not require this invariance (H1). The resulting chi-square was 454.95 for 410 degrees of freedom. Comparison of these values with the first model resulted in an insignificant chi-square difference (32.92 for 26 degrees of freedom). The results indicate that constraining factor loadings to be equal across SES groups does not result in a significantly worse fit. Consequently, in the remainder of the analyses these weightings were constrained to be equal.

The chi-square associated with H3, which constrained the gamma estimates to be the same, resulted in chi-square value of 466.17 with 416 degrees of freedom. The chi-square differences between H3 and H2 was 11.22 with a difference in degrees of freedom of 6. Since the chi-square difference was nonsignificant, the gammas were constrained to be equal in the final hypothesis test which constrained the betas to be equal across SES groups. H4 resulted in chi-square of 475.05 with 422 degrees of freedom. This represented an insignificant chi-square difference of 8.88 with 6 degrees of freedom. The beta estimates were therefore considered to be equal in the three SES groups.

The invariance chi-square difference tests revealed that adding constraints consistent with the assumptions of the invariance of lambda, gammas, and betas did not significantly reduce goodness-of-fit. Based on these results, the free elements in these matrices were assumed to be invariant across SES groups.

Table 4 contains unstandardized estimates and standard errors of the factor loadings associated with the final model (H4). Only two factor loading estimates were not significantly different from 0: 1) commitments to educational goals, and 2) family and friend support for educational objectives. The patterns of association indicated by most estimates were logical and consistent with previous research. Community College degree aspirations and commitment to educational goals were positively associated with the goal/institutional commitment latent variable. The negative association of transfer intentions and the latent construct, while

inconsistent with model expectations, is consistent with prior research conducted at the College (Grosset, 1990).

The pattern of associations among the lambda coefficients associated with the external commitment latent construct were both consistent with expectations and prior research. Responsibility for dependents and lack of support from family and friends for educational pursuits contributed to external commitment while working at an off-campus job had the opposite association with this latent construct. All of the lambdas associated with the academic and social integration constructs were positive indicating a pattern of association that was consistent with expectations.

Insert Table 4 about here

As a whole, the observed variables for the exogenous variables did an adequate job as measurements for the latent variables. The total coefficient of determination for the X variables in the model which held the lambda parameter estimates equal were: lowest SES = 0.741, lower to middle SES = 0.753, middle to upper SES = 0.739. The observed Y variables were better measures of the endogenous concepts having the following total coefficients of determination: lowest SES = 0.896, lower to middle SES = 0.896, middle to upper SES = 0.819.

The unstandardized regression weights for the causal model and their standard errors are presented in Table 5. The first equation in the model, which examined the effects of goal intentions and

commitments on academic integration, was poorly determined. Intentions and commitments did not have a significant effect on academic integration. The squared multiple correlation for this structural equation was 0.009 for the lowest SES group, 0.02 for the lower to middle SES group, and 0.006 for the middle to upper SES group. The exogenous variable, goals and commitments, accounted for virtually none of the variance in academic integration in the three SES groups.

Insert Table 5 about here

The second structural equation in the model examined the effects of two exogenous variables, goal intentions and commitments and external commitments, and the endogenous variable, academic integration, on social integration. The estimates of the direct effects were significant for all three paths. Goal intentions and commitments and academic integration had a positive effect on social integration while external commitments had the opposite effect on social integration. Goal intentions and commitments, academic integration and external commitments accounted for 51% of the variance in social integration for lowest SES students, 56% of the variance for lower to middle SES students, and 68% of the variance for middle to upper SES students.

The final structural equation assessed the effects of the two exogenous variables, goal intentions and commitments and external commitments, and two endogenous variables, academic integration and

social integration, on student outcomes. Both of the effect coefficients reflecting the paths from academic integration and social integration to outcomes were significant. The squared multiple correlation for the structural equation was 0.457 for the lowest SES students, 0.302 for lower to middle SES students, and 0.462 for middle to upper SES students. The total coefficient of determination for the structural equations was 0.186 for the lowest SES students, 0.259 for the lower to middle SES groups, and 0.260 for the middle to upper SES students.

Discussion

The theoretical expectation that the quality of classroom and non-classroom experiences among faculty, staff and students have an unmediated effect on student outcomes was confirmed by the sample data. Higher levels of academic and social engagement had positive direct effects on the educational outcomes of African American students enrolled at a large urban community college.

Other paths in the model that were supported in the present research included the positive direct effects of goal and institutional commitments and the negative impact of external commitments on social integration. These results underline the indirect nature of goals, institutional commitment, and external commitments in the attainment of educational outcomes. Students entering the College with higher degree intentions, both at the College and in general, and higher levels of institutional commitment were more satisfied with their out-of-class faculty and peer experiences. In turn, these experiences had a positive

association with persistence and development. External commitments had a negative impact on social integration. Financial concerns and dependent responsibilities decreased the student's level of social integration which, in turn, negatively influenced persistence and progress.

Although the research was confirmatory, a post hoc adjustment was made to the path between the integration constructs in the model. The significant positive path from academic integration to social integration makes intuitive sense, especially for nonresidential community college students. Typically students with external commitments have a limited amount of time for campus activities outside of the classroom. For these students, socially integrating experiences will occur within the classroom. It seems reasonable that a student who is comfortable engaging in conversations about academic topics with faculty and peers in the classroom will be more likely to engage classmates in conversations of a nonacademic nature prior to and after class.

From a conceptual standpoint, the major failing of the Tinto model was that the significance of the path from goals and commitments to academic integration was not supported by the data. This is in contrast to the finding that the path from goals and commitments to social integration was significant. While the nature of the relationship in both cases was in the hypothesized direction, goals and commitments related positively to both academic integration and social integration, the unstandardized coefficient for academic integration was not sufficiently larger

than its standard error. A possible explanation for this finding is related to a weakness in the measurement component of the model. Hayduk (1988) cautions that coefficients associated with the observed variables that contain a large degree of measurement error or lack validity will underestimate the influence of a cause. The measurement of exogenous concepts was influenced by two observed variables with insignificant factor loadings indicating weak associations between these latent and observed variables. One of these factor loadings represented the link from the goals and commitments construct to the goal commitment measure, an association that could be more important to academic than to social integration. This may explain the significant path to social but not to academic integration.

Tests for the invariance of the measurement component of the model indicated that the slopes in the regression of the observed variables on the factors were the same across SES groups. With regard to the structural component, the three SES groups were affected by the constructs in the model in the same way.

Hayduk (1988) suggests that chi-square is instructive for sample sizes ranging from 50 to 500, although this range may depend on the kinds of models estimated. The relatively small sample sizes in this study suggest a cautious approach in interpretation. The concern over a minimally acceptable sample size is that if the sample is too small, chi-square may have insufficient power to detect and reject models that may be false. Acceptance of a model may be due to low power rather that a good model. In general, the

larger the sample, the better the protection against accepting a false model. While the sample sizes in this study demonstrated some level of power based on empirical testing procedures and LISREL results which converged to proper solutions, it would be instructive to repeat this analysis with larger sample sizes to determine if study results are replicable.

This study is limited in several other respects. Care must be taken not to over-generalize the findings of the present study. The results presented herein are based on a relatively small sample of students enrolled at a single institution. Consequently, these results may or may not be generalizable to situations and populations on other campuses depending on the similarity of campus environments and student body composition. Within the studied institution itself, the generalizability of study results can be raised as well. Although initially based on randomized selection techniques, the sample was in the end self-selected. Comparative analyses between survey respondents and nonrespondents across a variety of demographic and entry ability measures indicated the groups differed significantly only with regard to gender. Females were more likely to respond to both surveys than were males (32.7% vs 26.0%). While the gender disparity was not large and the nature of gender differences unknown, the results should be interpreted cautiously for males since they are slightly underrepresented in this sample.

Given these concerns, a tentative case can be made for practices that encourage the academic and social involvement of the

student. With regard to academic integration, the importance that students attach to their academic performance needs to be recognized. Two measures of student academic fit were indicators of the academic integration construct. GPA, a measure of the student's integration into the college's academic milieu, represents the student's ability and willingness to meet the academic standards of the institutions. Whereas GPA is an institutionally derived barometer of student/academic fit, the Academic Integration scale represents a subjective student-based assessment of academic fit with the College. In this study both dimensions of academic integration related positively to student outcomes.

In order to encourage positive academic experiences, academic assessment programs coupled with placement in courses designed to offset gaps in preparation should be strengthened. Counseling should focus on insuring that bridging experiences are available to students who are not college-ready and faculty should actively seek out students who exhibit early signs of academic at-risk behavior, such as missing classes, and provide them with additional support, either themselves or through referrals to other support services.

A persistent challenge to strengthening both academic and social integration occurs within the classroom. Teaching strategies should accommodate the strengths and weaknesses of diversely prepared learners. Faculty should encourage greater intellectual and social contacts among students by utilizing teaching methods which involve students as individuals and as

groups. By enhancing student interaction, the classroom can be used as a vehicle for social integration. This can be especially important for part-time students who spend limited non-classroom time on campus.

In this study, external commitments were indirectly important to student outcomes through their influence on social integration. While external influences are often beyond the direct control of college staff, several steps can be taken to mitigate crises brought about by external commitments. Students should be linked to some systematic, structured support network when they enter the college. There should be clearly identified institutional resources which will intervene when students are confronted with an academic or personal crisis which may impact upon their decision to re-enroll or interfere with their learning.

Mentoring programs should be expanded. Academic advising should be a systematic process which creates and sustains a relationship between student and advisor that is characterized by continuous, meaningful dialogue that provides accurate, consistent, accessible information to students concerning progress towards their goals. Advisors should contact students who are experiencing academic problems or have not recently met with an adviser.

BIBLIOGRAPHY

Baird, Leonard. (1984). The undergraduate experience: Commonalities and difference among college. Research in Higher Education 31 (3): 271-278.

Bean, J.P. (1983) The application of a model of turnover in work organizations to the student attrition process. The Review of Higher Education 6: 129-148.

Bollen, Kenneth A. (1987). Structural Equation Modeling With Latent Variables. New York: Wiley.

Bryne, Barbara M., Shavelson, Richard J., Muthen, Bengt. (1989). Testing for the equivalence of factor covariance and mean structures: The issue of partial measurement invariance. Psychological Bulletin 105.(3): 456-466.

Castle, E.M. (1993). Minority student attrition research; Higher educations challenge for human resource development. Educational Research 22 (7): 24-28.

Davis, R. (1991). Social support networks and undergraduate student academic success related outcomes. In W.R. Allen, E. Epps & N. Haniff (Eds) College in Black and White.Albany, NY: State University of New York Press.

Donovan, Rebecca. (1984). Path analysis of a theoretical model of persistence in higher education among low-income black youth. Research in Higher Education 21 (3): 243-259.

Fadale, La Verna. (1990). Factors related to retention in postsecondary occupational education: Emphasis on minority student population. Albany, NY: State University of New York, Two Year College Development Center.

Gordon, M. (1964). Assimilation in American Life. New York: Oxford University Press.

Gosman, Erica J., Dandridge, Betty A., Nettles, Michael T., and Thoeny, A. Robert. (1983). Predicting student progression: The influence of race and other student performance. Research in Higher Education 18 (2) 209-236.

Grosset, J. (1982). Student profile - full-time, part-time, and new, continuing, and stop-out status. (Institutional research Report No. 20). Philadelphia, PA: Community College of Philadelphia, Office of Institutional Research.

Grosset, Jane. (1990). An exploration of the importance of campus academic and social experience to the process of student persistence at CCP. (Institutional Research Report No. 51). Community College of Philadelphia, Office of Institutional Research.

Hauser, Robert M. (1992). Trends in college entry among Whites, Blacks, and Hispanics, 1972-1988. Publication of the Institute for Research on Poverty, University of Wisconsin, Madison, WI.

Hayduk, Leslie A. (1988). Structural Equation Modeling With LISREL. Baltimore MD: The Johns Hopkins Press.

Joreskog, K.G. and Sorbom, Dag. (1989). Lisrel 7 User's Reference Guide. Mooresville, IN: Scientific Software.

Kroc II, Richard J. (1992). Producing informative persistence rates. Paper presented at the Association for Institutional Research Annual Forum, Atlanta, GA.

Marsh, Herbert W. and Grayson, David. (1990). Public/catholic differences in the high school and beyond data: A multigroup structural equation modeling approach to testing mean differences. Journal of Educational Research, 15: 199-235.

Mincey, Ronald, Sawhill, Isabel V. and Wolf, Douglass A. (1990). The underclass: definition and measurement. Science 248: 450-453.

Moline, A. (1987). Financial aid and student persistence: An application of causal modeling. Research in Higher Education 26 (2): 130-147.

Nettles, Michael T. (1988). Toward Black Undergraduate Student Equality in American Higher Education. New York: Greenwood Press.

Nettles, Michael T. (1990). The Effect of Assessment on Minority Student Participation. San Francisco/Oxford: Jossey-Bass Inc.

Nettles, Michael T., Thoeny, A. Robert and Gossman, Erica. (1985). A comparative analysis of the predictors of black and white students' academic achievement in college. Paper presented at Annual Meeting of the American Education Research Association, Chicago, IL.

Ogagke, Lynn and Gordon, Edmund. (1991). Correlates of high and low achievement in minority students. Presented at the Annual Meeting of the American Educational Research Association, Boston, MA.

Pascarella, E.T. (1985). Racial differences in factors associated with bachelor's degree completion: A nine year follow-up. Research in Higher Education 23 (4): 351-373.

Pascarella, E.T. and Chapman, D. W. (1983). A multi-institutional, path analytic validation of Tinto's model of college withdrawal. American Educational Research Journal 20: 87-102.

Pascarella, E.T. and Terenzini, P.T. (1980). Predicting freshmen persistence and voluntary dropout decision form a theoretical model. Journal of Higher Education 51: 60-75.

Pascarella, E.T. and Terenzini, P.T. (1983). Predicting voluntary freshmen year persistence/withdrawal behavior in a residential university: A path analytic validation of Tinto's model. Journal of Educational Psychology 75: 215- 226.

Smith, Daryl G. (1992). The challenge of diversity: Implication for institutional research. In Michael Nettles (ed.). The Effect of Assessment on Minority Student Participation. San Francisco/London: Jossey- Bass, Inc.

Sondgrath, Mary S. and Stough, Laura M. (1992). Factors influencing the persistence of ethnic minority students enrolled in a college engineering program. Paper presented at Annual Meeting of Educational Research Association, San Francisco, CA.

Stage, Frances K. (1989). Reciprocal effects between the academic and social integration of college students. Research in Higher Education 30 (5): 517-530.

Stewart, Donald M. (1987). From access to achievement: Strategies for urban institutions. Paper presented at conference sponsored by National Center for Postsecondary Governance and Finance: Los Angeles, CA.

Terenzini, Patrick, Theophilides, Christos, and Lorang, Wendell. (1984). Influences on student's perceptions of their personal development during the first three years of college. Research in Higher Education 21 (2): 178-197.

Three Realities - Minority Life in the United States. (1990). A Report of the Business - Higher Education Forum. Washington, D.C: American Council on Education.

Tinto, Vincent. (1987). Leaving College. Chicago, IL: The University of Chicago Press.

Wilson, W.J. (1978). The Declining Significance of Race: Blacks and Changing American Institutions. Chicago IL: University of Chicago Press.

TABLE 1

GOODNESS-OF-FIT RESULTS FOR NULL AND A PRIORI MODELS

LOWEST SES

Model	X^2	df	X^2/df	GFI	AGFI
Null model	334.52**	134		0.763	0.708
A priori model	174.77*	129	1.35	0.905	0.875

LOWER TO MIDDLE SES

Model	X^2	df	X^2/df	GFI	AGFI
Null model	275.34**	134		0.757	0.701
A priori model	156.39	129	1.21	0.898	0.885

MIDDLE TO UPPER SES

Model	X^2	df	X^2/df	GFI	AGFI
Null model	235.27**	134		0.754	0.698
A priori model	154.78	129	1.20	0.898	0.866

* $p < .05$ ** $p < .01$

TABLE 2

STEPS IN FITTING BASELINE MODELS

LOWEST SES

Model	X^2	df	$\hat{}X^2$	$\hat{}$df	X^2/df	GFI	AGFI
1	174.77	129	-	-	1.35	0.905	0.875
2	146.77	128	28.00**	1	1.15	0.919	0.893

LOWER TO MIDDLE SES

Model	X^2	df	$\hat{}X^2$	$\hat{}$df	X^2/df	GFI	AGFI
1	156.39	129	-	-	1.21	0.913	0.885
2	136.02	128	20.37**	1	1.06	0.932	0.909

MIDDLE TO UPPER SES

Model	X^2	df	$\hat{}X^2$	$\hat{}$df	X^2/df	GFI	AGFI
1	154.78	129	-	-	1.20	0.898	0.866
2	139.24	128	15.54**	1	1.09	0.918	0.892

* $p < .05$ ** $p < .01$

Model 1. A prior model

Model 2. Same as Model 1 with path from Academic Integration to social Integration free

TABLE 3

RESULTS OF INVARIANCE HYPOTHESIS TESTING

Model	X^2	df	^df	^X^2	Sig
Equality of form	422.03	384	-	-	
Equality of lambda	454.95	410	26	32.92	_
Equality of gammas	466.17	416	6	11.22	_
Equality of betas	475.05	422	6	8.88	_

TABLE 4

MAXIMUM LIKELIHOOD MEASUREMENT COEFFICIENT ESTIMATES

UNSTANDARDIZED FACTOR LOADING AND (STANDARD ERRORS)

	Lambda X - Factors	
Variable	Goal/Institutional Commitment	External Commitment
-Degree Plans (General)	1.0*	0
-Degree Plans (the College)	1.027 (.394)	0
-Transfer Intent	-1.254 (.520)	0
-Goal Commitment	0.529 (.310)	0
-Financial Aid	0	1.0*
-# of Dependents	0	0.278(.127)
-Work Hours	0	-0.807(.226)
-Family/Friend Support	0	0.080(.117)

TABLE 4 continued

MAXIMUM LIKELIHOOD MEASUREMENT COEFFICIENT ESTIMATES

UNSTANDARDIZED FACTOR LOADING AND (STANDARD ERRORS)

	Lambda Y - Factors		
Variable	Academic Integration	Social Integration	Student Outcomes
-Fac Contacts	1.0*	0	0
-GPA	0.797(.386)	0	0
-Fac Concern Sc	2.763(.870)	0	0
-Class Invol Sc	2.012(.441)	0	0
-Acad Integ Sc	1.887(.408)	0	0
-Out-of-Class Sc	0	1.0*	0
-Peer Integ Scale	0	1.504(.258)	0
-Satisfying friends	0	1.172(.217)	0
-Persistence	0	0	1.0*
-Progress	0	0	1.118(.547)

*fixed at 1.0

TABLE 5

CAUSAL MODEL PARAMETERS

UNSTANDARDIZED COEFFICIENTS AND STANDARD ERRORS

Gammas	Unstandardized Coefficient	Standard Error
Goal Commitment -> Academic Int	0.037	.072
Goal Commitment -> Social Int	0.152	.065
External Commitment -> Social Int	-0.216	.092

Betas	Unstandardized Coefficient	Standard Error
Academic Integration -> Social Int	1.447	.503
Academic Integration -> Outcomes	0.463	.166
Social Integration -> Outcomes	0.183	.086